DOCUMENT RESUME

ED 068 853 CG 007 552

AUTHOR Tobias, Sigmund; Hedl, John J., Jr.

TITLE Test Anxiety: Situationally Specific or General?

INSTITUTION Florida State Univ., Tallahassee. Computer-Assisted Instruction Center.

SPONS AGENCY Office of Naval Research, Washington, D.C. Psychological Sciences Div.
REPORT NO CAI-TM-49
PUB DATE Jun 72
NOTE 27p.

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS *Anxiety; Behavioral Science Research; *College Students; Evaluation; Measurement; *Psychological Patterns; Psychological Testing; Response Mode; *Response Style (Tests); Student Testing; *Testing Problems; Test Wiseness

ABSTRACT

This paper reports two experiments whose purpose was to relate two bodies of research on anxiety: test and trait-state anxiety. It was reasoned that state anxiety measures obtained in an evaluation testing condition should be more similar to test anxiety than state anxiety measures obtained in non-evaluative situations, such as a game in Study I or an instructional setting in Study II. The subjects consisted of sixty students drawn from an undergraduate educational psychology course. The results of both studies failed to confirm the hypothesis. Test anxiety was less sensitive to fluctuations of evaluative stress than state anxiety, and more closely related to general trait anxiety. The authors discussed a number of implications of these results which appeared to be of interest to anxiety theory in general. Both studies indicated that test anxiety is more nearly a trait measure than a state measure. (Author)

FILMED FROM BEST AVAILABLE COPY

ED 068853

CAI CENTER

TECH MEMO

TEST ANXIETY: SITUATIONALLY SPECIFIC OR GENERAL?

Sigmund Tobias and John J. Hedl, Jr.

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY

Tech Memo No. 49
June 15, 1972

CG 007 552

Project NR 154-280
Sponsored by
Personnel & Training Research Programs
Psychological Sciences Division
Office of Naval Research
Arlington, Virginia
Contract No. N00014-68-A-0494

Approved for public release; distribution unlimited.

Reproduction in whole or in part is permitted for any purpose of the United States Government.

FLORIDA STATE UNIVERSITY

Tech Memo Series

The FSU-CAI Center Tech Memo Series is intended to provide communication to other colleagues and interested professionals who are actively utilizing computers in their research. The rationale for the Tech Memo Series is three-fold. First, pilot studies that show great promise and will eventuate in research reports can be given a quick distribution. Secondly, speeches given at professional meetings can be distributed for broad review and reaction. Third, the Tech Memo Series provides for distribution of pre-publication copies of research and implementation studies that after proper technical review will ultimately be found in professional journals.

In terms of substance, these reports will be concise, descriptive, and exploratory in nature. While cast within a CAI research model, a number of the reports will deal with technical implementation topics related to computers and their language or operating systems. Thus, we here at FSU trust this Tech Memo Series will serve a useful service and communication for other workers in the area of computers and education. Any comments to the authors can be forwarded via the Florida State University CAI Center.

Duncan N. Hansen
Director
CAI Center

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)

Florida State University
Computer-Assisted Instruction
Tallahassee, Florida 32306

2a. REPORT SECURITY CLASSIFICATION
Unclassified

2b. GROUP

3. REPORT TITLE

Test Anxiety: Situationally Specific or General?

4. DESCRIPTIVE NOTES (Type of report and inclusive dates)

Tech Memo No. 49, June 15, 1972

5. AUTHOR(S) (First name, middle initial, last name)

S. Tobias and John J. Hedl, Jr.

6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b NO OF REFS
June 15, 1972	16	11

8a. CONTRACT OR GRANT NO	9a. ORIGINATOR'S REPORT NUMBER(S)
N00014-68-A-0494	
b. PROJECT NO NR 154-280	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
c.	
d.	

10. DISTRIBUTION STATEMENT

Approved for public release; distribution unlimited. Reproduction in whole or in part is permitted for any purpose of the United States Government.

11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY
	Personnel & Training Research Programs Office Of Naval Research Arlington, Virginia

13. ABSTRACT

This paper reports two experiments whose purpose was to relate two bodies of research on anxiety: test and trait-state anxiety. It was reasoned that state anxiety measures obtained in an evaluative testing condition should be more similar to test anxiety than state anxiety measures obtained in nonevaluative situations, such as a game in Study I or an instructional setting in Study II. The results of both studies failed to confirm this hypothesis. Test anxiety was less sensitive to fluctuations of evaluative stress than state anxiety, and more closely related to general trait anxiety.

DD FORM 1 NOV 65 1473 (PAGE 1)

S/N 0101-807-6811

Security Classification

A-31408

Security Classification

14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT

FORM 1473 (BACK)
DD 1 NOV 65
S/N 0101-807-6821

Security Classification
A-31409

DoD
CG

TEST ANXIETY: SITUATIONALLY SPECIFIC OR GENERAL?

Sigmund Tobias and John J. Hedl, Jr.

Tech Memo No. 49
June 15, 1972

Project NR 154-280
Sponsored by
Personnel & Training Research Programs
Psychological Sciences Division
Office of Naval Research
Arlington, Virginia
Contract No. N00014-68-A-0494

Approved for public release; distribution unlimited.

Reproduction in whole or in part is permitted for any purpose of the United States Government.

TEST ANXIETY: SITUATIONALLY SPECIFIC OR GENERAL?

Sigmund Tobias and John J Hedl, Jr
Florida State University

ABSTRACT

This paper reports two experiments whose purpose was to relate two bodies of research on anxiety: test and trait-state anxiety. It was reasoned that state anxiety measures obtained in an evaluative testing condition should be more similar to test anxiety than state anxiety measures obtained in non-evaluative situations, such as a game in Study I or an instructional setting in Study II. The results of both studies failed to confirm this hypothesis. Test anxiety was less sensitive to fluctuations of evaluative stress than state anxiety, and more closely related to general trait anxiety.

TEST ANXIETY: SITUATIONALLY SPECIFIC OR GENERAL?[1]

Sigmund Tobias[2] and John J. Hedl, Jr.[3]
Florida State University

Anxiety is a construct of importance in many different behavioral disciplines. Research and theory on anxiety have typically treated this construct as a personality variable which was relatively stable over extended periods of time. The conception that anxiety had considerable situational variance was implicit in the construct of test anxiety as originated by Mandler and Sarason (1952), and most recently reviewed by Wine (1971). Spielberger, Lushene, and McAdoo (1971) have pointed to the importance of assessing the temporal fluctuations of anxiety over different situations in their conception of state anxiety. The purpose of the present study was to relate these two areas of research in which the situational and temporal characteristics of anxiety have been studied.

Spielberger, et al. (1971) have emphasized the necessity to distinguish between anxiety as a transitory state and anxiety as a relatively stable personality trait. Anxiety as a state (A-State) is conceptualized as an affective condition in the student characterized by feelings of dread or apprehension which vary in intensity, fluctuate over time, and are highly responsive to situational stress. Trait anxiety (A-Trait), on the other hand, is conceptualized as the relatively long term personality trait of anxiety proneness, i.e., the disposition to respond with elevations of state anxiety under conditions of threat

to self-esteem. Clearly, these two conceptions of anxiety are not independent of one another, and the theoretical expectation of a moderate positive relationship between state and trait anxiety has been empirically verified (Spielberger, Gorsuch, & Lushene, 1970).

Test anxiety was conceptualized as anxiety proneness in a specific situation: the testing situation. It was anticipated that a scale which focused specifically on the student's feelings about testing situations would be more closely related to test performance than measures dealing with anxiety as a more general personality trait. Operationally, test anxiety has been measured by the Test Anxiety Questionnaire (Mandler & Sarason, 1952) or by the Test Anxiety Scale (Sarason, 1958).

The test anxiety construct deals specifically with the feelings aroused in an individual in the testing situation. State anxiety, on the other hand, is not tied to any particular situation, but instead refers to the degree to which transitory feelings of anxiety may be aroused in <u>any</u> situation. Therefore, state anxiety aroused during a testing situation should be closely related to the construct of test anxiety. On the other hand, state anxiety aroused during a nontesting or nonevaluative situation, such as a game-like or an instructional situation, should be marginally related to test anxiety. It was the purpose of these two studies to test this hypothesis.

Study I

The research design consisted of placing students in a situation involving no explicit evaluative stress (game), and then administering

the Slosson Intelligence Test, a situation of some evaluative stress, via computer. Measures of state anxiety were obtained both before and after each of the two situations. Students participated in both types of tasks.

Procedures

The procedures were administered in the following sequence: (a) a pretask period during which students responded to the Test Anxiety Scale (TAS; Sarason, 1958) and the A-Trait scale of the State-Trait Anxiety Inventory (STAI; Spielberger, et al. 1970). (b) A nonevaluative period during which students played a game on a cathode ray terminal connected to an IBM 1500 instructional system. (c) An evaluative period during which the Slosson Intelligence Test (Slosson, 1963) was administered via computer. The five-item STAI A-State scale was administered both before and after the game and the intelligence test.

Nonevaluative Period . Students received written instructions informing them how to operate the computer terminal. They then responded to the brief five-item A-State scale, with instructions to respond in terms of "How do you feel right now." Practice in the operation of the terminal keyboard was presented and students "signed on" to the computer game.

During the game students worked individually at computer terminals. The game consisted of a simulated horse race in which artificial odds on six horses were given and an imaginary budget of $10,000 allotted for "betting." Students were then asked to indicate on which horses they wanted to bet, the amount of the bet, and whether they wished to bet to win, place, or show. After the best had been placed, the actual race was

viewed on a cathode ray terminal. Six horses were included in each race, represented by elongated "m"s. The computer program simulated the race by allowing the various "horses" to flash across the screen at a predetermined, randomly selected pace. Winning or losing at the game was randomly determined. Students were allowed to play the horse race game for 20-25 minute periods. At the conclusion of any one race students were informed of the present status of their imaginary bank account and asked whether they wished to bet on the upcoming race. Following completion of the game period, the five-item A-State scale was readministered with instructions to indicate "How did you feel during the game you just played?"

Evaluative Period. A detailed description of terminal operations for the administration of the Slosson Intelligence Test on the computer terminal was presented. A brief attitude scale dealing with feelings toward computer testing was then administered. After "signing on" to the terminal, students again completed the five-item A-State scale with instructions to indicate how they felt at present.

The computer-administered Slosson Intelligence Test was then taken by each student. Test items were individually presented on the computer terminal and students responded to each question by typing in their responses. The computer program immediately evaluated the adequacy of answers, and when the scoring of particular items was indeterminate, students were asked to amplify their answers (Hedl, 1971).

The computer program began by presenting item 21-3 to all students. Following this item, the program proceeded sequentially in reverse to

establish a basal age. When basal age had been reached, students were branched forward to item 21-6 and the program continued to administer items until students reached either the test ceiling or the end of the test items. Ceiling was defined as failure on 10 consecutive items, and basal when this number was passed.

When the test had been completed, the five-item A-State scale was readministered with instructions to respond in terms of how they felt during the intelligence test they had just completed.

Subjects

A total of 60 students participated in this experiment (25 males; 35 females). The sample was drawn from an undergraduate educational psychology course; volunteers received course credit for their participation.

Results and Discussion

The hypothesis demanded that the A-State measure dealing with the students' feelings during the intelligence test would be highly similar to a measure of test anxiety. This hypothesis was investigated by multiple linear regression techniques (Cohen, 1968). A full model was generated consisting of all four A-State scores, regressing into the TAS. Two restricted models were then formulated. In the first of these, the A-State dealing with the student's feelings during the intelligence testing was deleted. The difference in the percentage of variance accounted for by these models was, therefore, a measure of the importance of specific evaluative stress on the relationship between the A-State and TAS. The results of this comparison yielded an F of 1.98 (df = 1/55), which was

not significant. The second restricted model deleted both the A-States administered during the intelligence test. Again, comparison with the full model was not significant (F = 1.01, df = 2/55).

The results of this analysis indicated that the A-State measures during the evaluative stress condition did not contribute any more variance to test anxiety than did the A-State measures during the presumably nonevaluative game situation. The hypothesis that state anxiety evoked during evaluative situations would be highly similar to test anxiety was, therefore, not confirmed.

Since the initial analysis indicated that test anxiety was not substantially related to state anxiety during evaluative conditions as initially hypothesized, a succeeding analysis was conducted to determine whether test anxiety was more similar to the construct of trait anxiety. For this analysis, a second full model was formulated, containing the four A-State measures and the scores on the A-Trait scale. A restricted model was then formulated from which the A-Trait score was deleted, leaving only the four A-State measures. This comparison yielded an F of 5.18 (df = 1/54), significant beyond the .05 level. The omission of the A-State measures from the full model in the presence of A-Trait did not result in a significant decline in accountable variance. These results strongly suggest that the test anxiety conception can be viewed as more nearly a trait measure than a state measure.

The design of this experiment assumed the operation of differential state anxiety as a function of the game and testing situations. In order to evaluate this assumption, a one-way analysis of variance for repeated

measures (Winer, 1971) was computed on the four A-State measures. Table 1 presents the means and standard deviations of these measures.

TABLE 1

Means and Standard Deviations of the STAI A-Trait, TAS, and STAI A-State Scores (N = 60)

Measures	M	SD
STAI A-Trait	38.13	9.39
TAS	14.60	7.06
STAI A-State		
Pre Game	8.07	2.85
Post Game	7.47	2.92
Pre IQ Test	9.63	3.04
Post IQ Test	10.40	3.76

This analysis yielded an F of 20.65 (df = 3/177), significant beyond the .001 level. These results indicated that there was an overall difference in the levels of A-State evoked by the experimental treatments. A further comparison of the Post Intelligence A-State scores with the Post Game A-State scores yielded a correlated t of 6.80 (df = 59), significant beyond the .001 level. Thus, the A-State data confirmed the assumed increase in evaluative stress as a function of the experimental treatments. Subsidiary analyses were conducted to determine whether state anxiety interacted with sex, and/or with A-Trait, and thus obscured the general trend of the data. Both of these analyses revealed no evidence of such interactions.

Study II

In the study reported above the relationship between test and state anxiety was investigated in a game-like and in an intelligence testing situation. The game-like situation was the best available approximation to a condition of minimal evaluative stress. On the other hand, a game situation is relatively atypical in terms of trying to generalize from anxiety research to student functioning in everyday school-like settings. In order, therefore, to make the results more generalizable to educational settings, the relationships between test and state anxiety in an instructional and achievement testing situation were also evaluated.

Study II examined the effects of a number of instructional variations upon achievement, in addition to an examination of the effects of state and test anxiety. The experimental design involved assigning students randomly to studying an instructional program in one situation, and in a second condition, the students were required to process the program at the same time that they were asked to recall CVC trigrams every 1, 2, or 3 frames. The second instructional treatment involved having half the students respond to the program by constructing their answers and receiving feedback concerning their accuracy. The other group read the program presented in the form of completed sentences. Achievement data pertaining to these differential instructional treatments will be reported elsewhere (Tobias, 1972a). The present report will focus on the relationship between the A-State measures and the Test Anxiety Scale during instructional and testing conditions.

Procedures and Subjects

When students reported for the experiment they were first administered the Test Anxiety Scale and the STAI A-Trait scale. Students were then familiarized with terminal operations, and randomly assigned to one of the four instructional treatments: reading the program with, or without interpolated CVCs, or constructing responses to the program with, or without CVCs. The five-item A-State scale was administered to each of these four groups at the following four points: prior to the instructional program, at the mid-point and end of the program, and at the end of the posttest.

The content of the program used in this study dealt with the diagnosis of heart disease via electrocardiogram (Tobias, 1972b). The program covers the technical terminology used in the diagnosis of heart disease, the characteristic ECG tracings, and type of muscle damage caused by different severities of heart disease. The program was presented on the cathode ray tube of the IBM 1500 system, as was the posttest which was administered immediately after the program. The four A-State anxiety scales were also administered on terminal. A total of 121 students participated in this study with research participating being required for satisfactory completion of the introductory general psychology course.

Results

The data of major interest concerned the relationship between the different STAI A-State scores and the Test Anxiety Scale. Again, it was expected that the A-State scale dealing with the students' feelings during the posttest should have a higher relationship with test anxiety than the

A-State measures administered during the course of instruction. It was, however, first necessary to determine whether the instructional manipulations had differential effects on A-State. A 2 x 2 x 4 ANOVA with repeated measures on the last factor was computed to examine this possibility. Five students were randomly deleted to achieve equal cell division. This analysis revealed that there were no differences in mean A-State scores between the groups studying only the program, and those doing program plus CVC (F = 1.36, df = 1/112). Nor were there any differences between the group constructing their responses and the group reading the programs (F = 1.69, df = 1/112). The interaction between these variables was also not significant (F = 2.7, df = 1/112). There were, however, significant differences among the four A-State measures (F = 4.87, df = 3/336, p < .01). Inspection of the four A-State means, depicted in Table 2, indicated that the A-State measure dealing with posttest was higher than

TABLE 2

Means and Standard Deviations of the STAI A-Trait, TAS, and STAI A-State Scores (N = 121)

Measures	M	SD
STAI A-Trait	39.09	9.02
TAS	16.98	6.82
STAI A-State		
Pre Instruction	9.83	3.16
Mid Instruction	9.69	3.79
Post Instruction	10.10	4.12
Posttest	10.88	4.22

any of the others. This was substantiated in a Newman-Keuls analysis (Winer, 1971), which indicated that the A-State dealing with the posttest was significantly higher than the others. This finding confirmed the assumption that the posttest was more stressful for the sample than were the instructional events. There was some evidence of interaction among the instructional variables and repeated measures; however, these are of little relevance for purposes of the present report.

The critical test of the hypothesis of Study II demanded that the A-State measures dealing with the student's feelings during the achievement test would be more similar to test anxiety than the A-States obtained during the instructional situation, and hence account for greater percentage of variance in TAS scores than the other A-State administered in the course of instruction. The regression analysis of these data paralleled that conducted in Study I. The full model again contained the four A-State measures and the first restricted model omitted the last A-State dealing with posttest. This comparison accounted for 1% of the variance and yielded an F of 1.58 (df = 1/116), which was not significant. When both the A-State measures obtained at the end of instruction and following after the posttest were dropped from the model, this comparison yielded non-significant results (F = 1.04, df = 2/116). These findings indicated that the A-State measure concerning the achievement test and the A-State measure obtained at the end of instruction, singly or in combination, did not account for a significantly greater percentage of variance than did the A-State measures obtained at the beginning and in the middle of instruction.

To determine whether TAS was more clearly related to the conception of anxiety as a trait, as opposed to state, a further analysis was computed, similar to that in Study I, in which the contribution of A-Trait to the full model was determined. This analysis indicated that the addition of A-Trait score accounted for an additional 11% of the variance in TAS score, (F = 15.20, df = 1/115, p < .001). Omitting any or all of the four A-State measures from the models in the presence of A-Trait failed to reduce the percentage of variance accounted for to any significant degree.

General Discussion

The general hypothesis of both investigations was that state anxiety measures obtained during testing situations should reflect feelings more similar to those yielded by a test anxiety measure than state anxiety measures obtained either during a game-like or an instructional situation. The latter settings were conceptualized as involving less evaluative stress than the testing situations, and therefore it was assumed that they ought to be more closely related to affective phenomena indicated by test anxiety test scores. The assumption that the testing situation evoked more evaluative concern and consequently led to higher anxiety than the game and instructional settings was confirmed by the observed increase in A-State scores during the testing situations in both studies. While the students did perceive evaluative situations as more anxiety arousing, the hypothesis that this anxiety was more closely related to TAS scores than the preceding A-State scales was not supported in either investigation. Instead, the results suggested

that test anxiety as measured by the TAS was as closely related to anxiety feelings elicited during game-like and instructional situations as it was to anxiety feelings evoked during evaluative situations.

There are a number of implications of these results which are of some interest to anxiety theory in general. First of all, it seems clear that the test anxiety construct is not as responsive to variations in situational stress as is the state anxiety measure. Instead, both studies indicated that test anxiety is more nearly a trait measure than a state measure. In conception, a trait measure is relatively stable both over time and over different types of situations. While the relative temporal stability of a trait measure poses no special problems to the construct of test anxiety, its generality with respect to different situations should raise questions with respect to the specificity of the test anxiety construct. In the present investigation, test anxiety was as closely related to state anxiety elicited during games and within instruction, as it was to state anxiety evoked during an intelligence or achievement test. It seems unlikely that the students viewed the game and instructional situations as being similar in stress to the test situations.

Evidence against this formulation is seen in the significant increase of A-State during the test situations. Nevertheless, it is possible that even though the test situation was seen as more evaluatively stressful, both the game and instructional situation did have a component of evaluative stress which accounted for the similarity in its relationship to TAS. If this is indeed the case, the construct of test anxiety would have to be significantly widened. Not only would it appear to reflect

students' feelings during occasions such as intelligence tests, surprise exams, final exams, pop quizzes, etc (all of these are taken from items in the TAS), but they apparently also are equally related to such apparently nonevaluative settings as a game or a course of instruction. These results suggest that within the limits imposed by the students and designs of the present studies, the construct of test anxiety is considerably more general than had been expected, and may not be limited only to specifically evaluative situations.

REFERENCES

Cohen, J. Multiple regression as a general data-analytic system. Psychological Bulletin, 1968, 70, 426-443.

Hedl, J. J., Jr. An evaluation of a computer-based intelligence test. Technical Report No. 21, Computer-Assisted Instruction Center, Florida State University, 1971.

Mandler, G., & Sarason, S. B. A study of anxiety and learning. Journal of Abnormal and Social Psychology, 1952, 47, 166-173.

Sarason, I. G. Interrelationships among individual difference variables, behavior in psychotherapy and verbal conditioning. Journal of Abnormal and Social Psychology, 1958, 56, 339-344.

Slosson, R. L. The Slosson Intelligence Test for Children and Adults. East Aurora: Slosson Education Publication, 1963.

Spielberger, C. D., Gorsuch, R. L., & Lushene, R. E. The State-Trait Anxiety Inventory (test manual). Palo Alto, California: Consulting Psychologist Press, 1970.

Spielberger, C. D., Lushene, R. E., & McAdoo, W. G. Theory and measurement of anxiety stress. In R. B. Cattel (Ed.), Handbook of Modern Personality Theory. Chicago: Aldine, 1971.

Tobias, S. Distraction and response mode in computer-assisted instruction. Unpublished manuscript, Florida State University, 1972. (a)

Tobias, S. The history of an individualized instructional program of varying familiarity to college students. Technical Memo No. 43, Computer-Assisted Instruction Center, Florida State University, 1972. (b)

Wine, J. Test anxiety and direction of attention. Psychological Bulletin, 1971, 76, 92-104.

Winer, B. J. Statistical principles in experimental design (2nd ed.) New York: McGraw-Hill, 1971.

FOOTNOTES

1. This research was supported by a contract to the Computer-Assisted Instruction Center, Florida State Univeristy, Tallahassee, Florida from the Office of Naval Research (N00014-68-A-0494). Portions of the data were presented at the meeting of the American Psychological Association, Honolulu, Hawaii, September, 1971.
2. Now at City College, City University of New York.
3. Now at the University of Texas, Southwestern Medical School at Dallas

DISTRIBUTION LIST

NAVY

4 Director, Personnel and Training
Research Programs
Office of Naval Research
Arlington, VA 22217

1 Director
ONR Branch Office
495 Summer Street
Boston, MA 02210

1 Director
ONR Branch Office
1030 East Green Street
Pasadena, CA 91101

1 Director
ONR Branch Office
536 South Clark Street
Chicago, IL 60605

1 Commander
Operational Test and Evaluation Force
U.S. Naval Base
Norfolk, VA 23511

6 Director
Naval Research Laboratory
Code 2627
Washington, DC 20390

12 Defense Documentation Center
Cameron Station, Building 5
5010 Duke Street
Alexandria, VA 22314

1 Chairman
Behavioral Science Department
Naval Command and Management Division
U.S. Naval Academy
Luce Hall
Annapolis, MD 21402

1 Chief of Naval Air Training
Code 017
Naval Air Station
Pensacola, FL 32508

1 Chief of Naval Training
Naval Air Station
Pensacola, FL 32508
ATTN: CAPT Allen E. McMichael

1 Chief of Naval Technical Training
Naval Air Station Memphis (75)
Millington, TN 38054

1 Chief
Bureau of Medicine and Surgery
Code 513
Washington, DC 20390

1 Commander Naval Air Reserve
Naval Air Station
Glenview, IL 60026

1 Commander
Naval Air Systems Command
Navy Department, AIR-413C
Washington, DC 20360

1 Commander
Submarine Development Group Two
Fleet Post Office
New York, NY 09501

1 Commanding Officer
Naval Air Technical Training Center
Jacksonville, FL 32213

1 Commanding Officer
Naval Personnel and Training
Research Laboratory
San Diego, CA 92152

1 Commanding Officer
Service School Command
U.S. Naval Training Center
San Diego, CA 92133
ATTN: Code 303

1 Head, Personnel Measurement Staff
Capital Area Personnel Service Office
Ballston Tower #2, Room 1204
801 N. Randolph Street
Arlington, VA 22203

1 Program Coordinator
Bureau of Medicine and Surgery (Code 71G)
Department of the Navy
Washington, DC 20390

1 Research Director, Code 06
Research and Evaluation Department
U.S. Naval Examining Center
Building 2711 - Green Bay Area
Great Lakes, IL 60088
ATTN: C.S. Winiewicz

1 Superintendent
Naval Postgraduate School
Monterey, CA 93940
ATTN: Library (Code 2124)

1 Technical Director
Naval Personnel Research and
Development Laboratory
Washington Navy Yard
Building 200
Washington, DC 20390

1 Technical Director
Personnel Research Division
Bureau of Naval Personnel
Washington, DC 20370

1 Technical Library (Pers-11B)
Bureau of Naval Personnel
Department of the Navy
Washington, DC 20360

1 Technical Library
Naval Ship Systems Command
National Center
Building 3 Room 3
S-08
Washington, DC 20360

1 Technical Reference Library
Naval Medical Research Institute
National Naval Medical Center
Bethesda, MD 20014

1 Behavioral Sciences Department
Naval Medical Research Institute
National Naval Medical Center
Bethesda, MD 20014

1 COL George Caridakis
Director, Office of Manpower Utilization
Headquarters, Marine Corps (AO1H)
MCB
Quantico, VA 22134

1 Mr. Sidney Friedman
Special Assistant for Research
and Studies
OASN (M&RA)
The Pentagon, Room 4E794
Washington, DC 20350

1 Mr. George N. Graine
Naval Ship Systems Command
(SHIPS 03H)
Department of the Navy
Washington, DC 20360

1 CDR Richard L. Martin, USN
COMFAIRMIRAMAR F-14
NAS Miramar, CA 92145

1 Mr. Lee Miller (AIR 413E)
Naval Air Systems Command
5600 Columbia Pike
Falls Church, VA 22042

1 Dr. James J. Regan
Code 55
Naval Training Device Center
Orlando, FL 32813

1 Dr. A. L. Slafkosky
Scientific Advisor (Code Ax)
Commandant of the Marine Corps
Washington, DC 20380

1 LCDR Charles J. Theisen, Jr., MSC, USN
CSOT
Naval Air Development Center
Warminster, PA 18974

ARMY

1 Behavioral Sciences Division
Office of Chief of Research and
Development
Department of the Army
Washington, DC 20310

1 U.S. Army Behavior and Systems
Research Laboratory
Rosslyn Commonwealth Building,
Room 239
1300 Wilson Boulevard
Arlington, VA 22209

1 Director of Research
U.S. Army Armor Human Research Unit
ATTN: Library
Building 2422 Morade Street
Fort Knox, KY 40121

1 COMMANDANT
U.S. Army Adjutant General School
Fort Benjamin Harrison, IN 46216
ATTN: ATSAG-EA

1 Commanding Officer
ATTN: LTC Montgomery
USACDC - PASA
Ft Benjamin Harrison, IN 46249

1 Director
Behavioral Sciences Laboratory
U S Army Research Institute of
Environmental Medicine
Natick, MA 01760

1 Commandant
United States Army Infantry School
ATTN: ATSIN-H
Fort Benning, GA 31905

1 Army Motivation and Training
Laboratory
Room 239
Commonwealth Building
1300 Wilson Boulevard
Arlington, VA 22209

1 Mr Edmund Fuchs
BESRL
Commonwealth Building, Room 239
1320 Wilson Boulevard
Arlington, VA 22209

AIR FORCE

1 AFHRL (TR/Dr. G. A. Eckstrand)
Wright-Patterson Air Force Base
Ohio 45433

1 AFHRL (TRT/Dr. Ross L. Morgan)
Wright-Patterson Air Force Base
Ohio 45433

1 AFHRL/MD
701 Prince Street
Room 200
Arlexandria, VA 22314

1 AFSOR (NL)
1400 Wilson Boulevard
Arlington, VA 22209

1 COMMANDANT
USAF School of Aerospace Medicine
ATTN: Aeromedical Library (SCL-4)
Brooks AFB, TX 78235

1 Personnel Research Division
AFHRL
Lackland Air Force Base
San Antonio, TX 78236

1 Headquarters, U S Air Force
Chief, Personnel Research and Analysis
Division (AF/DPXY)
Washington, DC 20330

1 Research and Analysis Division
AF/DPXYR Room 4C200
Washington, DC 20330

1 Headquarters Electronic Systems Division
ATTN: Dr. Sylvia R. Mayer/MCIT
LG Hanscom Field
Bedford, MA 01730

1 CAPT Jack Thorpe USAF
Dept of Psychology
Bowling Green State University
Bowling Green, OH 43403

DOD

1 Mr. William J. Stomer
DOD Computer Institute
Washington Navy Yard
Building 175
Washington, DC 20390

1 Mr. Joseph J. Cowan, Chief
Psychological Research Branch (P-1)
U S Coast Guard Headquarters
400 Seventh Street, SW
Washington, DC 20590

OTHER GOVERNMENT

1 Dr. Alvin E. Goins, Chief
Personality and Cognition Research Section
Behavioral Sciences Research Branch
National Institute of Mental Health
5600 Fishers Lane
Rockville, MD 20852

1 Dr. Andrew R. Molnar
Computer Innovation in Education Section
Office of Computing Activities
National Science Foundation
Washington, DC 20550

1 Office of Computer Information
Center for Computer Sciences and
Technology
National Bureau of Standards
Washington, DC 20234

MISCELLANEOUS

1 Dr Scarvia Anderson
Executive Director for Special Development
Educational Testing Service
Princeton, NJ 08540

1 Professor John Annett
The Open University
Walton teale, BLETCHLEY
Bucks, ENGLAND

1 Dr Richard C Atkinson
Department of Psychology
Stanford University
Stanford, CA 94305

1 Dr Bernard M Bass
University of Rochester
Mangement Research Center
Rochester, NY 14627

1 Professor Mats Bjorkman
University of Umea
Department of Psychology
Radhuseplanaden 2
S-902 47 UMEA/SWEDEN

1 Dr David G Bowers
Institute for Social Research
University of Michigan
Ann Arbor, MI 48106

1 Mr H Dean Brown
Stanford Research Institute
333 Ravenswood Avenue
Menlo Park, CA 94025

1 Dr. Jaime Carbonell
Bolt Beranek and Newman
50 Moulton Street
Cambridge, MA 02138

1 Dr. Kenneth E. Clark
University of Rochester
College of Arts and Sciences
River Campus Station
Rochester, NY 14627

1 ERIC
Processing and Reference Facility
4833 Rugby Avenue
Bethesda, MD 20014

1 Dr Victor Fields
Department of Psychology
Montgomery College
Rockville, MD 20850

1 Dr Robert Glaser
Learning Research and Development Center
University of Pittsburgh
Pittsburgh, PA 15213

1 Dr Albert S Glickman
American Institutes for Research
8555 Sixteenth Street
Silver Spring, MD 20910

1 Dr Bert Green
Department of Psychology
John Hopkins University
Baltimore, MD 21218

1 Dr M D Havron
Human Sciences Research, Inc.
Westgate Industrial Park
7710 Old Springhouse Road
McLean, VA 22101

1 Human Resources Research Organization
Division #3
Post Office Box 5787
Presidio of Monterey, CA 93940

1 Human Resources Research Organization
Division #4, Infantry
Post Office Box 2086
Fort Benning, GA 31905

1 Human Resources Research Organization
Division #5, Air Defense
Post Office Box 6057
Fort Bliss, TX 79916

1 Library
HumRRO Division Number 6
P.O. Box 428
Fort Rucker, AL 36360

1 Dr. Lawrence B. Johnson
Lawrence Johnson and Associates, Inc.
2001 "S" Street, NW
Suite 502
Washington, DC 20009

1 Dr. Norman J. Johnson
Associate Professor of Social Policy
School of Urban and Public Affairs
Carnegie-Mellon University
Pittsburgh, PA 15213

1 Dr. Roger A. Kaufman
Graduate School of Human Behavior
U.S. International University
8655 E. Pomerada Road

1 Dr. E. J. McCormick
Department of Psychological Sciences
Purdue University
Lafayette, IN 47907

1 Dr. Robert R. Mackie
Human Factors Research, Inc.
Santa Barbara Research Park
6780 Cortona Drive
Goleta, CA 93017

1 Mr. Luigi Petrullo
2431 North Edgewood Street
Arlington, VA 22207

1 Dr. Robert D. Pritchard
Assistant Professor of Psychology
Purdue University
Layfayette, IN 47907

1 Dr. Diane M. Ramsey-Klee
R-K Research & System Design
3947 Ridgemont Drive
Malibu, CA 90265

1 Dr. Joseph W. Rigney
Behavioral Technology Laboratories
University of Southern California
3717 South Grand
Los Angeles, CA 90007

1 Dr. Leonard L. Rosenbaum, Chairman
Department of Psychology
Montgomery College
Rockville, MD 20850

1 Dr. George E. Rowland
Rowland and Company, Inc.
Post Office Box 61
Haddonfield, NJ 08033

1 Dr. Benjamin Schneider
Department of Psychology
University of Maryland
College Park, MD 20742

1 Dr. Robert J. Seidel
Human Resources Research Organization
300 N. Washington Street
Alexandria, VA 22314

1 Dr. Arthur I. Siegel
Applied Psychological Services
Science Center
404 East Lancaster Avenue
Wayne, PA 19087

1 Dr. Henry Solomon
George Washington University
Department of Economics
Washington, DC 20006

1 Dr. Benton J. Underwood
Department of Psychology
Northwestern University
Evanston, IL 60201

1 Mr. C. R. Vest
General Electric Co.
6225 Nelway Drive
McLean, VA 22101

1 Dr. David Weiss
University of Minnesota
Department of Psychology
Elliott Hall
Minneapolis, MN 55455